Depth profile of ^{90}Sr concentration in soil ar Kawamata and Namie Town, Fukushima Prefecture

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Due to the accident of Fukushima Daiichi nuclear power plant (FDNPP) in Japan, large amounts of fission product in the nuclear reactor have been released into the atmosphere. Long lived radioactive nuclides such as ^{90}Sr and radioactive cesium (^{134}Cs and ^{137}Cs), are the most significant radionuclides in the nuclear accident and the environmental fate of these nuclides have been attention. The activities of radioactive cesium can easily be determined from gamma-ray spectroscopy by Ge semiconductor detectors. Contrary to radioactive cesium, pure beta-ray emitting nuclide; ^{90}Sr should be identified after chemical isolation. This is reason the studies on environmental behavior related to ^{90}Sr were very limited compare to these of radioactive cesium. A part of the released radionuclides from the nuclear reactor deposits on the land area with rainfall. The environmental behavior of the radionuclides is different behaviors for downward movement due to the difference in on its chemical property[1]. The types of the soil and contensts of organic matter and clay minerals strongly affects the downward movement of radioactive nuclides. To estimate the long-term environmental behavior, it is necessary to evaluate the environmental dynamics of radionuclides in Fukushima prefecture. In this study, depth-profiling of ^{90}Sr and radioactive cesium were investigated with different surrounding environments near the FDNPP.Soil samples were obtained at young aged cedar forests in Kawamata Town, and at the open land of Namie Town, Fukushima Prefecture, 2016. Because the radioactive nuclides were supplied from the organic phase to the soil with time passing, radioactivities in the litter was also identified for the sample in Kawamata town. For determination of radioactive cesium concentrations, γ-ray measurement by high purity germanium detectors were performed. For ^{90}Sr identification, we adopted a multistage classical precipitation method to separate ^{90}Sr fraction. To detect ^{90}Sr activities, the growth of ^{90}Y; daughter nuclide of ^{90}Sr was measured from Cherenkov light counting. The yield of ^{90}Sr was determined from the amount of ^{nat}Sr added before the chemical separation as a carrier by ICP-MS measurement.

[1] S. Forsberg et al., J. Environ. Radioactivity., 2000, 50, 235-252

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